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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/055,420 | 01/23/2002 | Xu Wu | 60.1377/SDR-067 | 7263 |
| 36822 | 7590 | 06/27/2005 | EXAMINER | |
| GORDON & JACOBSON, P.C. 60 LONG RIDGE ROAD SUITE 407 STAMFORD, CT 06902 | | | STOCK JR, GORDON J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2877 | |

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/055,420

Applicant(s)

WU ET AL.

Examiner

Gordon J. Stock

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-10 is/are allowed.
- 6) ☒ Claim(s) 11-23 and 25 is/are rejected.
- 7) ☒ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 11, 12, and 17** are rejected under 35 U.S.C. 102(b) as being anticipated by **Potter (5,0974,632)**.

As for **claim 11**, Potter in a fiber optic diffuser discloses the following: an optical probe (Fig. 1: 20) having a distal end (Fig. 2c: 19) comprising a substantially uniform cone having a face at forty five degrees relative to a longitudinal axis (Fig. 1: 24; Fig. 2c: each face at forty five degrees to axis to make a theta angel of ninety degrees)

As for **claim 12**, Potter discloses everything as above (see **claim 11**). In addition, optical probe terminates at a sharp tip (Fig. 2c: tip of 19).

As for **claim 17**, Potter discloses everything as above (see **claim 11**). In addition, the optical probe's fiber has a diameter of .4 mm, 400 microns (col. 3, line 62).

3. **Claims 18-19** are rejected under 35 U.S.C. 102(b) as being anticipated by **Hirschfeld (4,542,987)** in evidence of **Wach et al. (6,222,970)**—previously cited.

As for **claims 18-19**, Hirschfeld in an optrode discloses the following: an optical probe comprising an optical fiber having a distal end, said distal end comprising a paraboloid and hemisphere (Fig. 9b). Wach in evidence also demonstrates a paraboloidal distal end of an optical fiber (Fig. 13).

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. **Claims 11-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mononobe et al. (6,236,783)**—previously cited.

As for **claims 11-14**, Mononobe in an optical fiber probe teaches the following: a distal end comprising three conical sections with tapering by having three conical sections of varying diameter and a sharp tip (Fig. 3). The system may also have a symmetrically rounded tip, which appears to be no more than twenty five percent of the width of the fiber (Fig. 13). As for a 45 +/- 2 degree face relative to the axis, he implies that this may be, for the beta angle may be 30 to 90 degrees and the alpha angle 30 or smaller (col. 9, lines 13-30). Therefore, it would be obvious to one skilled in the art that the cone may have a face that is 45 +/- 2 degrees relative to the axis, for the beta angle may be between 30 and 90 degrees and the alpha angle may be zero degrees.

6. **Claims 15-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mononobe et al. (6,236,783)**—previously cited in view of **Friedman (5,371,826)**—previously cited.

As for **claims 15-16**, Mononobe discloses everything as above (see **claim 14**). He mentions tapering from 10-30 and 30 or less (col. 9, lines 25-35). He is silent concerning the taper being less than ten degrees or at most 5 degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it

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would be obvious to one skilled in the art to have the system have a taper of at most five degrees to minimize light loss and optimize light convergence.

7. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Mononobe et al. (6,236,783)**—previously cited in view of **Wu et al. (6,023,340)**—cited by applicant.

As for **claim 17**, Mononobe discloses everything as above (see **claim 11**). He is silent concerning the diameter being from 200 to 400 microns. However, Wu in an optical probe teaches that 10 to 1000 microns or 100 to 300 microns work well for fiber diameters (col. 7, lines 50-55). Therefore, it would be obvious to one skilled in the art to have the fiber be 200 to 400 microns in diameter, for optical probes work well with fiber diameters between 10 and 1000 microns.

8. **Claim 20** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Hirschfeld (4,542,987)** in evidence of **Wach et al. (6,222,970)**—previously cited in view of **MacDonald (5,044,723)**—previously cited.

As for **claim 20**, Hirschfeld in evidence of Wach discloses everything as above (see **claim 18**). Hirschfeld also discloses a base adjacent said hemisphere end that tapers to hemisphere (Fig. 9b). He is silent concerning the optical fiber having a base adjacent formed through tapering; whereas, the diameter of the base adjacent spherical shape would decrease as it tapers to the distal spherical end. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance detection for fluids (col. 2, lines 34-55); whereas, the taper conforms to the shape of the distal end (Figs. 7-8). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a base adjacent larger in diameter than the distal

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end spherical shape that tapers to the distal end of lesser diameter in order to enhance detection of the fluid probe.

9. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Hirschfeld (4,542,987)**) in evidence of **Wach et al. (6,222,970)**—previously cited in view of **MacDonald (5,044,723)**—previously cited further in view of **Friedman (5,371,826)**—previously cited.

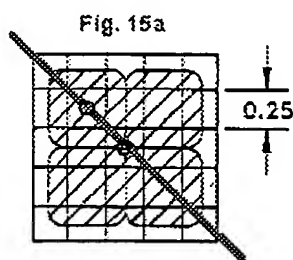
As for **claim 21**, Hirschfeld in evidence of Wach and in view of MacDonald disclose everything as above (see **claim 20**). They are silent concerning the taper being less than ten degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one skilled in the art to have the system have a taper of be less than ten degrees for a taper at most at five degrees minimizes light loss and optimizes light convergence.

10. **Claim 22** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)**—previously cited.

As for **claim 22**, Sahagen in a probe for monitoring a fluid medium discloses the following: an optical probe having at least one fiber with one flush distal end (Fig. 14a). As for one fiber having a substantially cubical corner defined by three planes substantially perpendicular to each other and not parallel to a plane including a longitudinal axis, Sahagen does not explicitly state this. However, Sahagen teaches with Fig. 15a a probe comprising a square end with 4 squared fibers; whereas, the longitudinal axis would pass through the center of the probe and a longitudinal axis of each squared fiber would pass through the center of each fiber; whereas, a plane including the longitudinal axis may encompass a plane passing through a

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line passing through the opposite corners of the probe and/or each squared fiber. See below (Sahagen: Fig. 15a): small circles represent approximate position of longitudinal axes and the diagonal line represents plane passing through longitudinal axes and not parallel to perpendicular planes:



Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the system would comprise a distal end comprising a substantially cubical corner defined by three orthogonal planes and not parallel to a plane including said longitudinal axis, for a squared optical fiber used in a flush ended probe such as embodiment 14a would have a distal end comprising four substantially cubical corners each defined by three planes perpendicular to each other not parallel to a diagonal plane including the longitudinal axis.

11. **Claim 23** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)**—previously cited in view of **Hirschfeld (4,542,987)**.

As for **claim 23**, Sahagen discloses an optical apparatus comprising: a measurement tool comprising an elongate body that is coupled to the optical fibre probes (see Figs. 2, 6, 7, 21 with two probe configurations: Figs. 24-28). And there is a light source to provide waves for emission through the end of the fiber optic (col. 8, lines 28-30). As for being placed in a well, Sahagen is silent. However, he teaches that the probes are used in harsh environments for monitoring fluid media (col. 3, lines 4-25). Therefore, it would be obvious to one of ordinary

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skill in the art at the time the invention was made that the measurement tool was suspended in a well in order, for the measurement tool is used to measure fluid media in harsh environments such as a deep well.

As for one probe comprising an optical fiber having a longitudinal axis and a distal end with a tapered tip arranged as a paraboloid or hemisphere, Sahagen is silent. However, he teaches that the system measures temperature (Fig. 3; col. 3, lines 15-20). Hirschfield in a temperature sensitive optrode teaches a probe comprising an optical fiber with a paraboloidal and hemispherical end with a longitudinal axis and tapering for measuring temperature in harsh or inaccessible environments (col. 1, lines 10-15; Fig. 9b). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have Sahagen's probe system comprise at least one probe comprising an optical fiber with a paraboloidal and hemispherical end with a longitudinal axis and tapering in order to measure temperature in a harsh or inaccessible environment such as a deep well.

12. **Claim 25** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ramos et al. (5,831,743)**—cited by applicant in view of **Allison et al. (5,812,729)**—previously cited.

As for **claim 25**, Ramos discloses the following: a tool having an elongate body suspended in the well (col. 1, lines 1-10; Fig. 2: 25); a light source (Fig. 2: 21); a plurality of optical probes coupled to said elongate body and to said light source (Fig. 2: 26, 25, 21; Fig. 5a: 51-53; Fig. 5b). Ramos is silent concerning the particular numerical apertures; however, he does state that one is a right probe (Fig. 5a: 52) and the others have angles producing light interface at 45 and 73 degrees with 45 and 75 degree outputs (col. 13, lines 25-35; col. 18, lines 30-35). Allison a high numerical aperture light transmitting device discloses that incidence of at least 67

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degrees from normal has a NA of .92 and that a normal fiber has a low angle of acceptance with a NA of .2 (Figs. 1 and 6). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the multiple probe had at least one distal end with a numerical aperture below .3 and one above .8 for a normal right faced optical fiber has a numerical aperture of .2 and an acceptance angle of 73 degrees has a numerical aperture greater than .92.

Allowable Subject Matter

13. **Claims 1-10** are allowed.

Claim 24 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to **claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream said distal end of said optical probe comprises a tapered tip having a substantially cubical corner defined by three planes substantially perpendicular to each other and not parallel to a plane including said longitudinal axis, in combination with the rest of the limitations of **claims 1-10**.

As to **claim 24**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream flowing in a well said plurality of optical probes includes a first probe comprising an optical fiber having a distal end arranged as either a substantially cubical corner or a substantially uniform cone and a second probe comprising an optical fiber having a distal end arranged as a paraboloid or a hemisphere, in combination with the rest of the limitations of **claim 24**.

Response to Arguments

14. Applicant's arguments, see Remarks, filed April 15, 2005, with respect to the rejections of **claims 1, 5-10** have been fully considered and are persuasive. The rejection of **claims 1, 5-10** under 35 U.S.C. 103(a) has been withdrawn.

Applicant's arguments with respect to **claims 11, 12, and 17** have been considered but are moot in view of the new ground(s) of rejection. As for the rejections of **claims 11-17** under 35 U.S.C. 103(a) with Mononobe et al. (6,236,783) Examiner apologizes for the inconvenience but upon further consideration of Mononobe et al. (6,236,783) the rejection of **claims 11-17** have been made. In regards to the remarks filed October 15, 2004 with the rejection of **claims 11-17** with Mononobe et al. (6,236,783) the arguments are not persuasive. Specifically, the argument that Mononobe teaches away from "substantially uniform cone" Examiner disagrees. The limitation of **claim 11** "said distal end of said optical probe comprises a substantially uniform cone" does not preclude having multiple tapers or multiple conical bases at the distal end of the fiber.

Applicant's arguments with respect to **claims 18-21, 23 and 25** have been considered but are moot in view of the new ground(s) of rejection.

Applicant's argument filed April 15, 2005 in regards to **claim 22** has been fully considered but is not persuasive. As for the claim being distinguishing over Sahagen in 'that the longitudinal axis cannot be the axis shown by the Examiner which utilizes multiple fibers of Sahagen" Examiner does not agree for Fig. 15a shown above (see rejection of claim 22 above) shows the longitudinal axis of a single squared fiber and a longitudinal axis of the four fiber probe.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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June 21, 2005



Zandra V. Smith

Primary Examiner

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